Update on
Viable Combat Avionics
aka
Affordable Combat Avionics
aka
Aging Avionics

Agenda

- Brief Introduction
- Paradigm Issue
- Past Year's Activities
- Future

Average Aircraft Age Trend

NRC

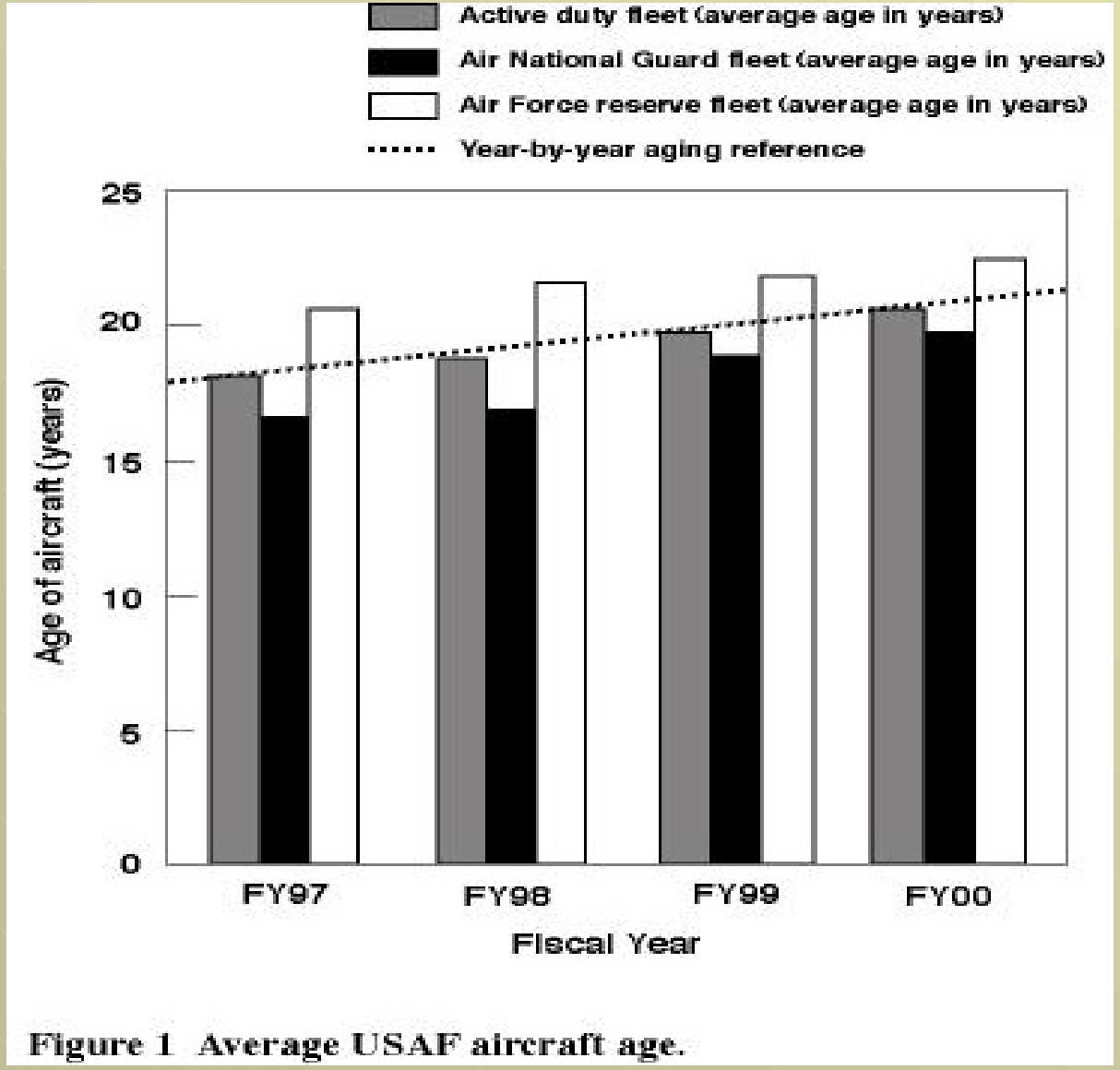
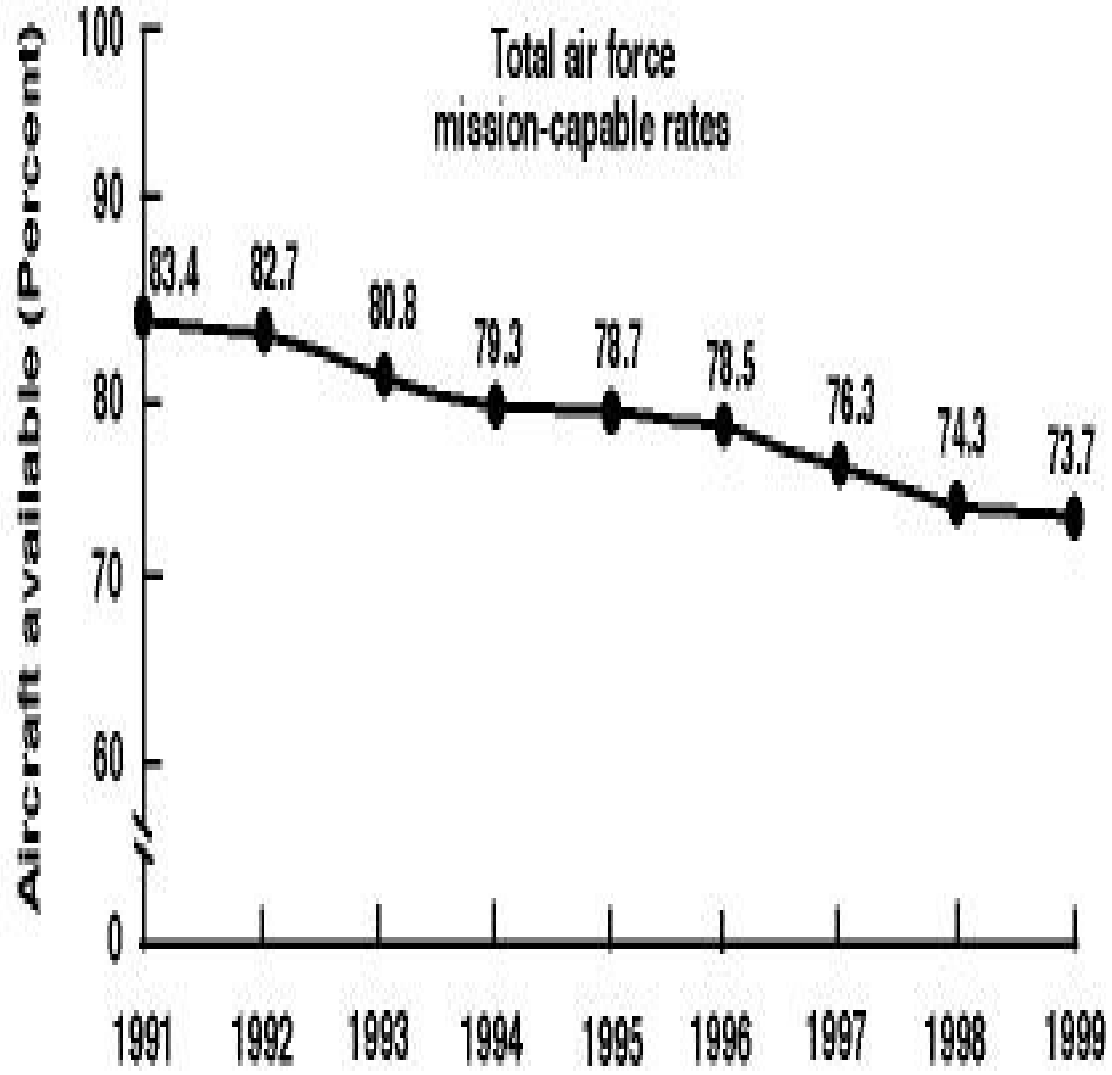


Figure 1 Average USAF aircraft age.

By 2015, Average Age Projected to Be 29 Years

Mission Capable Trend

NRC



During 1990's, Mission Capable Rate declined ~ 10 per centage points

Projected O & M Cost Trends

NRC

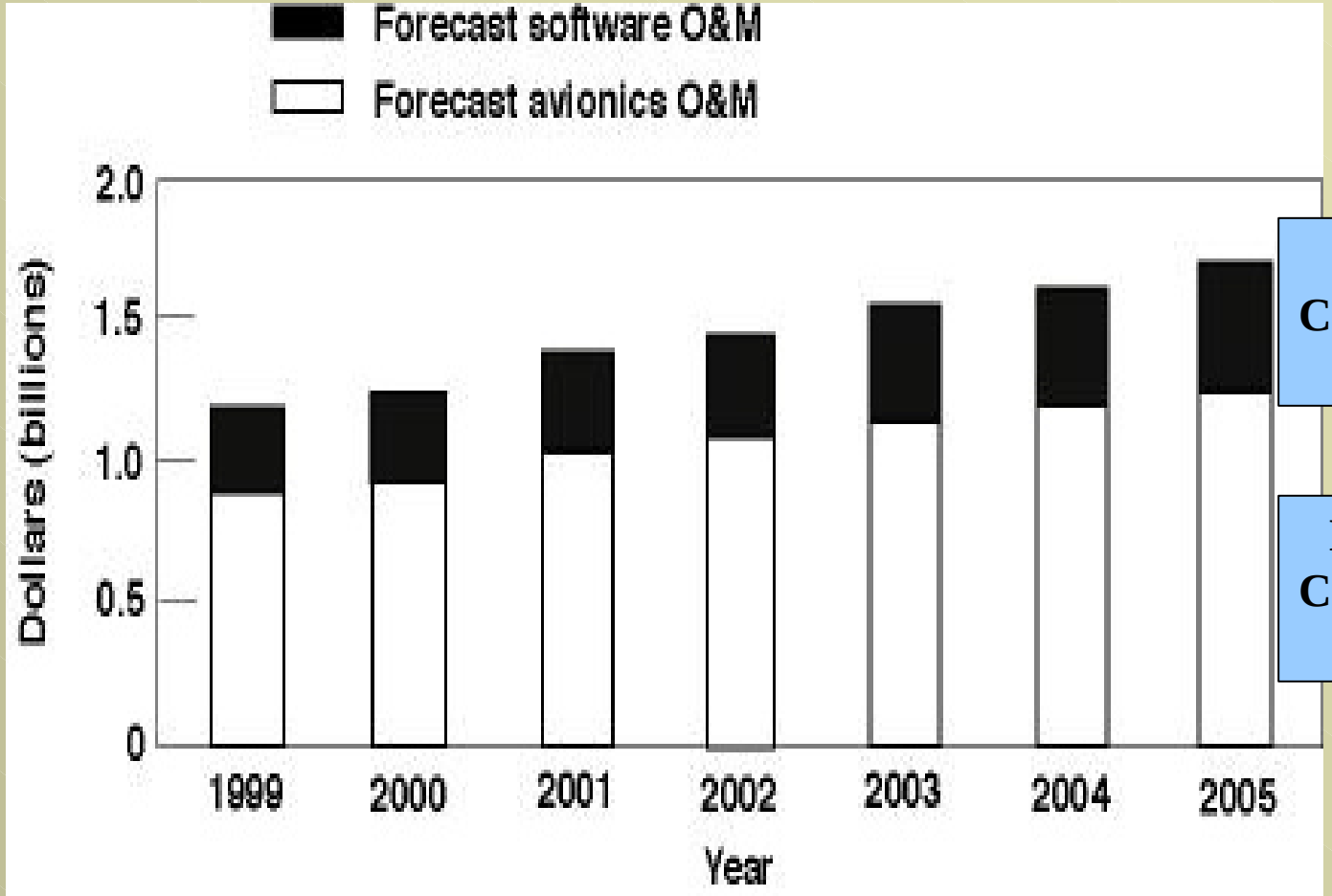


Figure 3 O&M cost forecasted to rise.

Software O & M Cost Growth ~ 40% from 1999

Hardware O&M Cost Growth ~ 50% from 1999

NRC

Modernization Investment Trend

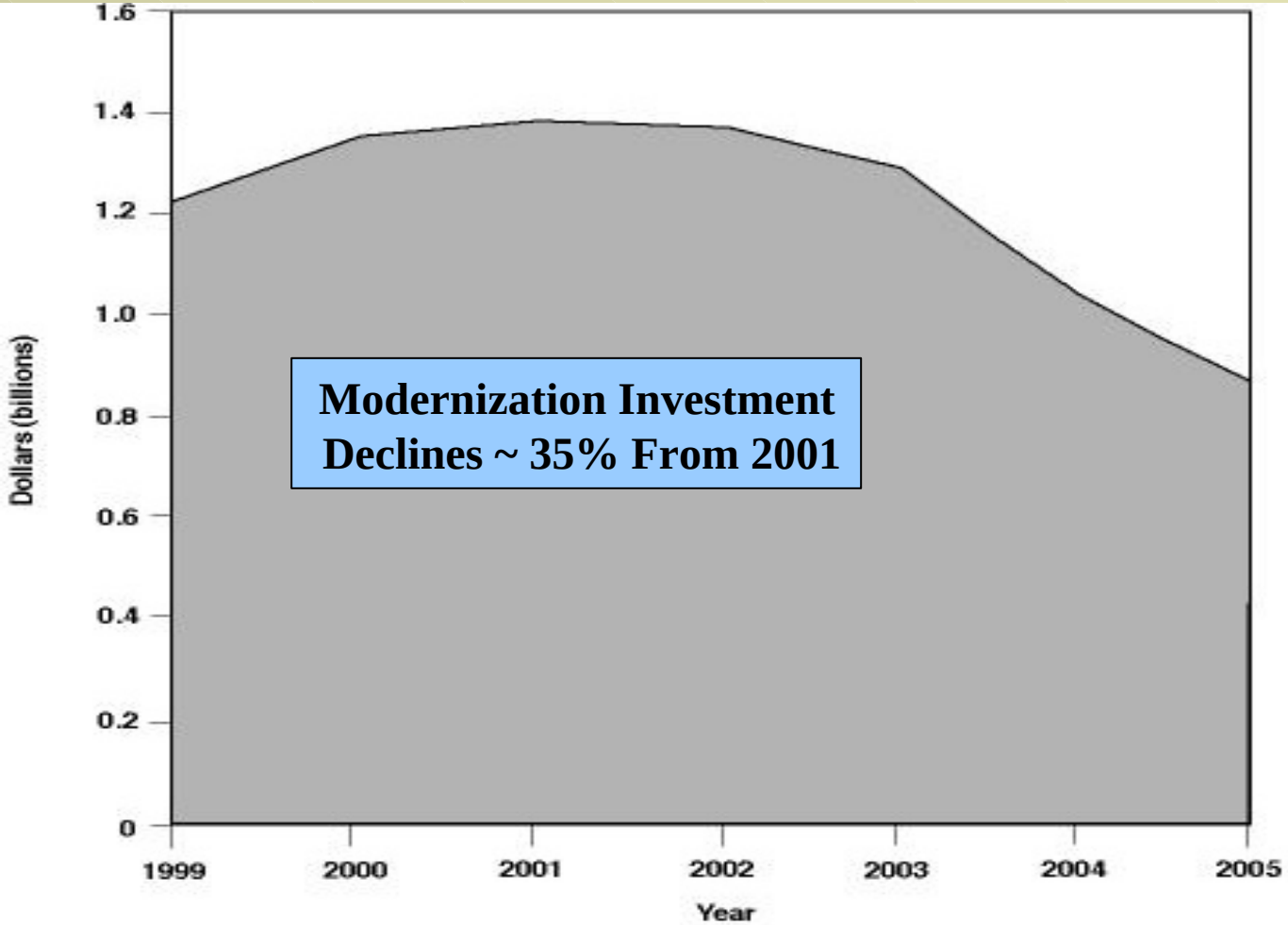


Figure 5 2000 President's budget request for avionics moderization declining

Trend Impacts

- Costs to upgrade systems are increasing
- System upgrade cycle time is increasing
- Developed systems not producible
- Sustainment costs are increasing

USAF can no longer afford to keep fleet current or upgrade to needed capabilities, i.e., Not viable

ACTION ITEM FROM CSAF/SECAF (Oct 98 QAPR)

"Present a plan to study the design of avionics systems to preclude their obsolescence

- **For weapons in the field, recommendations on how to keep those systems current and supportable**
- **For future systems, a design strategy that facilitates substitution of modern electronics over a system's life"**

Action Item Response (Bottom Line)

- **For weapons systems in the field**
  - **Define future state *affordable open systems avionics architecture***
  - **Institutionalize evolutionary acquisition strategies to migrate systems architecture to that future state**
  - **Better integrate affordability and supportability requirements with war-fighter modernization plans**
- **For future systems**
  - **Require use of *affordable open systems***
  - **Ensure integrated master plans endorse evolutionary acquisition**
  - **Ensure source selection evaluation criteria address supportability and the system's total ownership cost**

Avionics Viability

Avionics Viability is the ability to efficiently support both the system's current and future affordability and capability needs

- Avionics Viability includes **(over the life of the system)** avionics producibility, supportability, and the ability to grow to meet operational capability needs
- Avionics Viability includes hardware, software, and verification as well as their support environments
- Avionics Viability is driven by a combination of technical architecture, processes, and business attributes
- Avionics (aviation electronics) includes prime equipment, support systems, training systems, production systems, test systems, ….

Viable Avionics Performance Goals:

- **System design and its implementation will be producible at the end of development and verification phase without additional research and development and can be efficiently kept producible**
- **System design, its implementation, development environment, and documentation will**
  - **Efficiently support future expansion of capability**
  - **Enable newer technology components to be efficiently substituted for existing components to improve reliability, reduce acquisition costs, and/or reduce support costs**
  - **Enable efficient updates of software**
  - **Support efficient verification of future changes**

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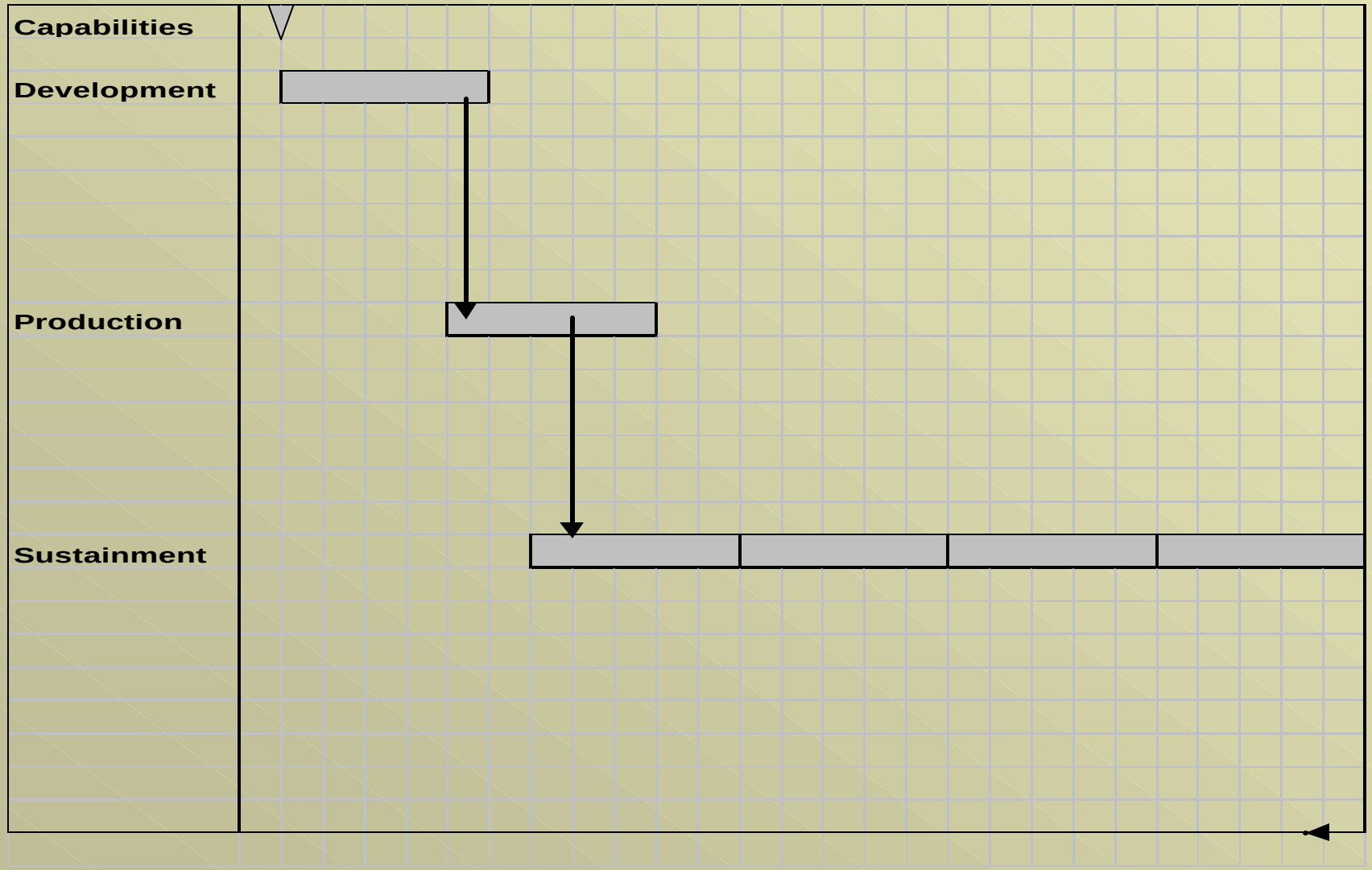
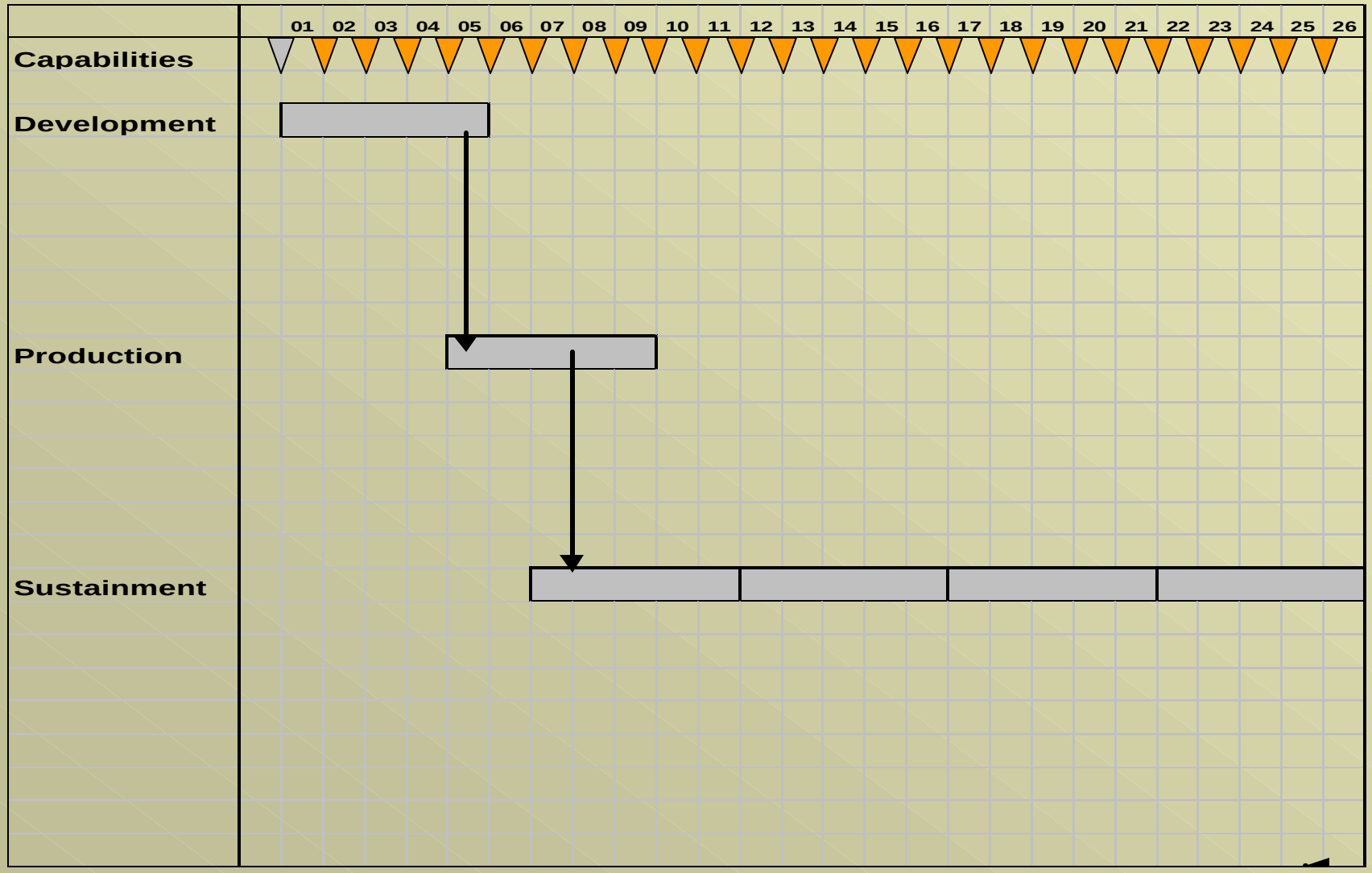
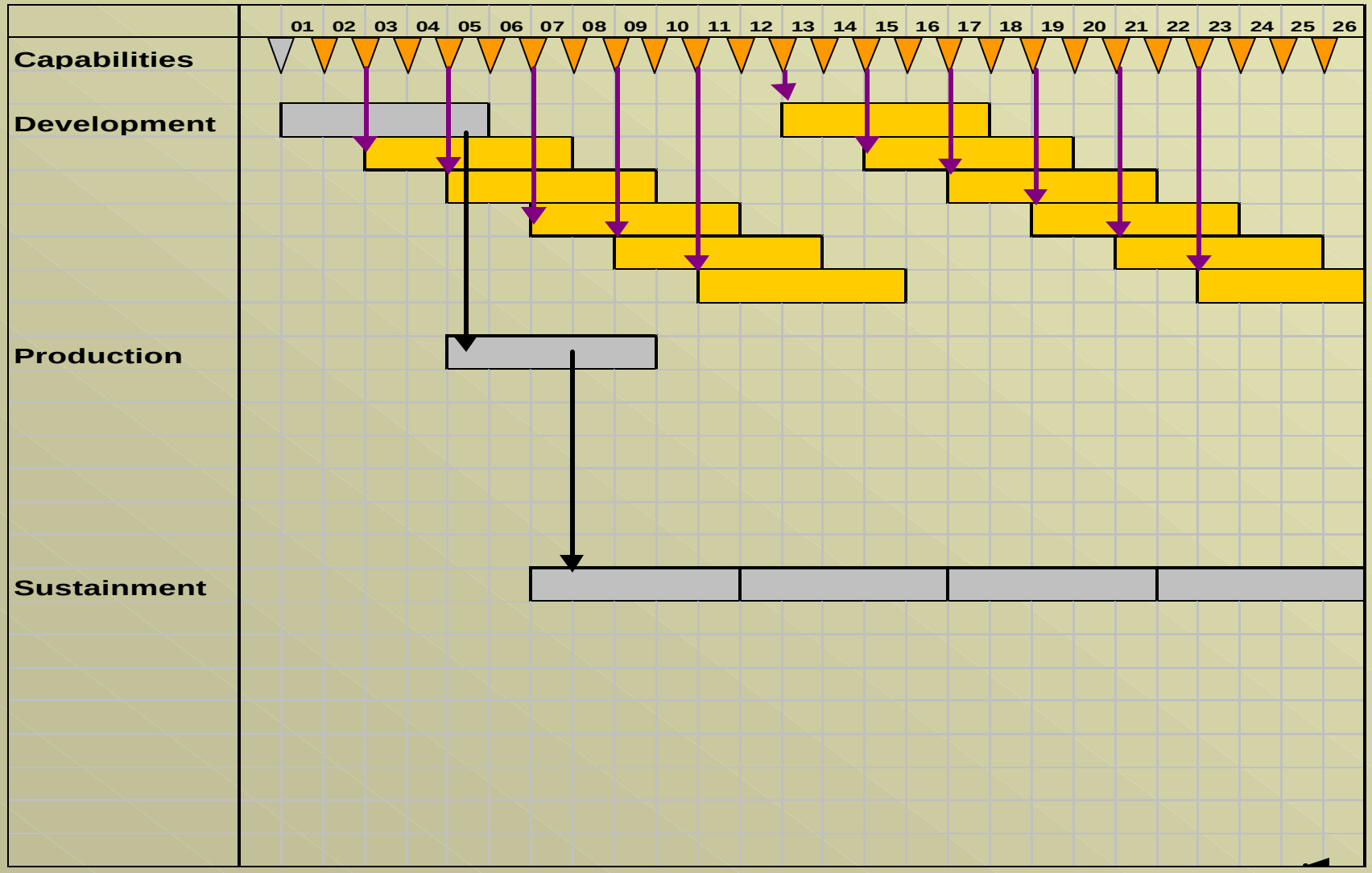
Traditional Program Plan



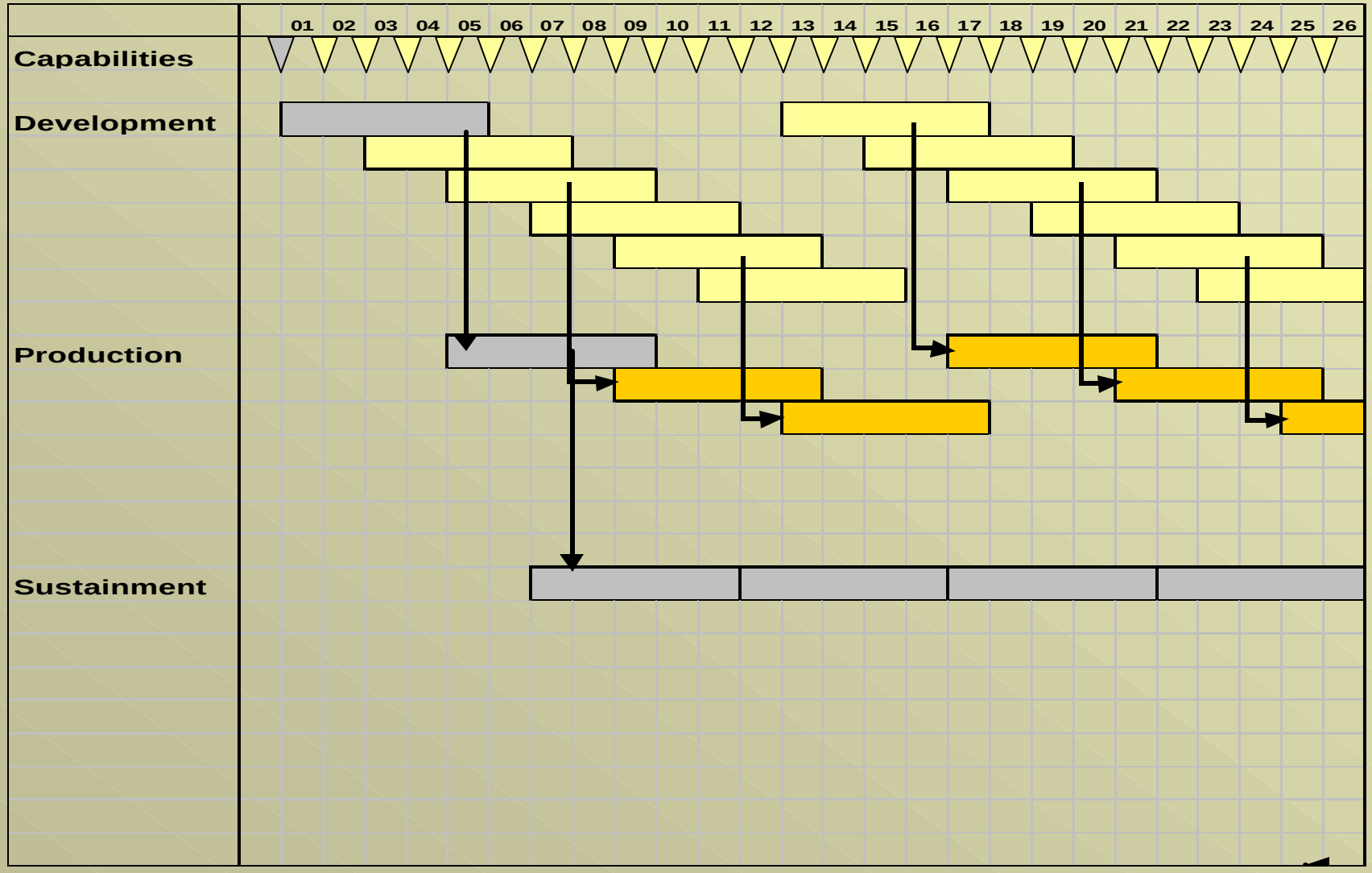
Desired Operational Capability Updates



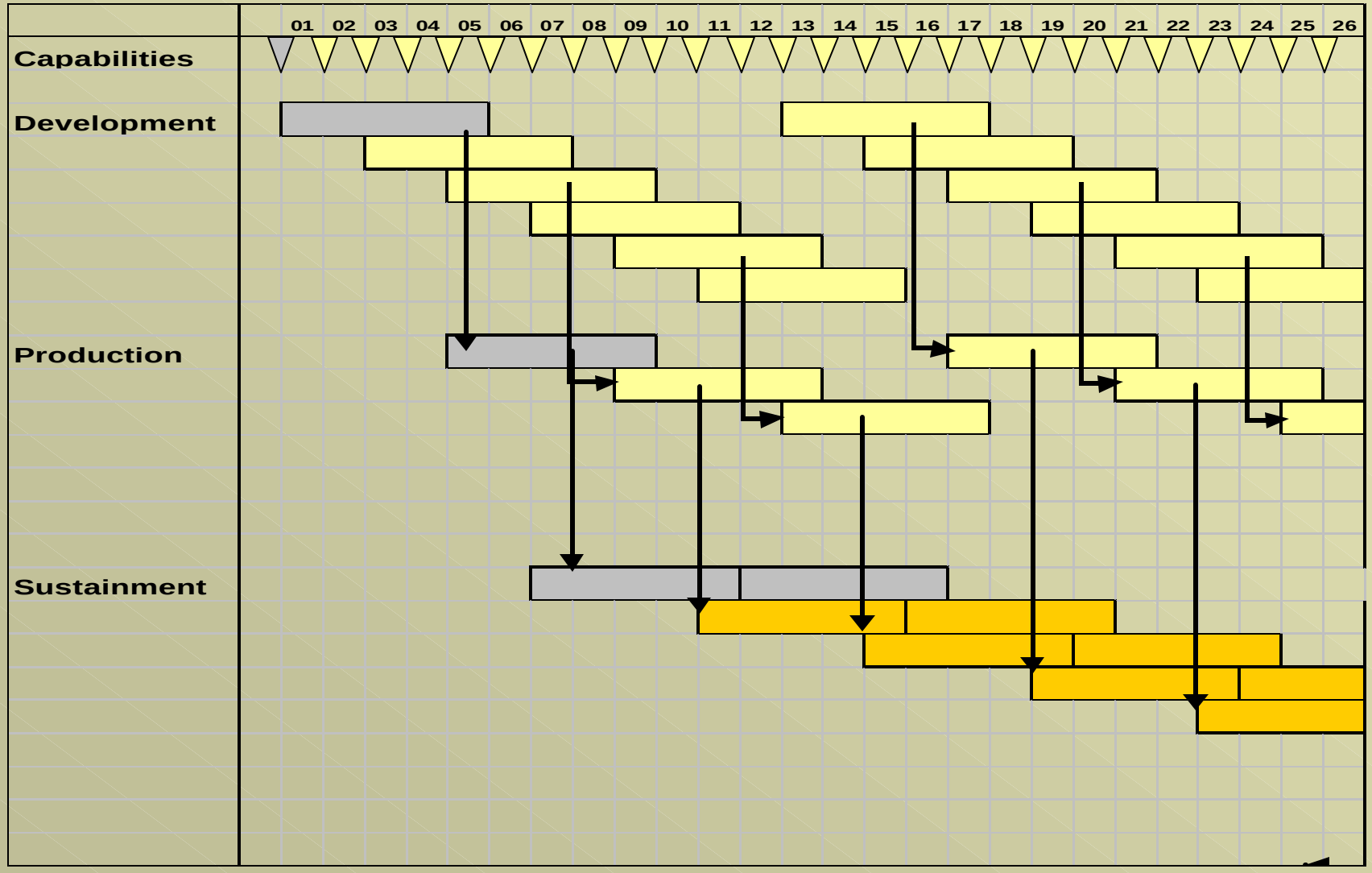
Operational Capability Updates Development Changes



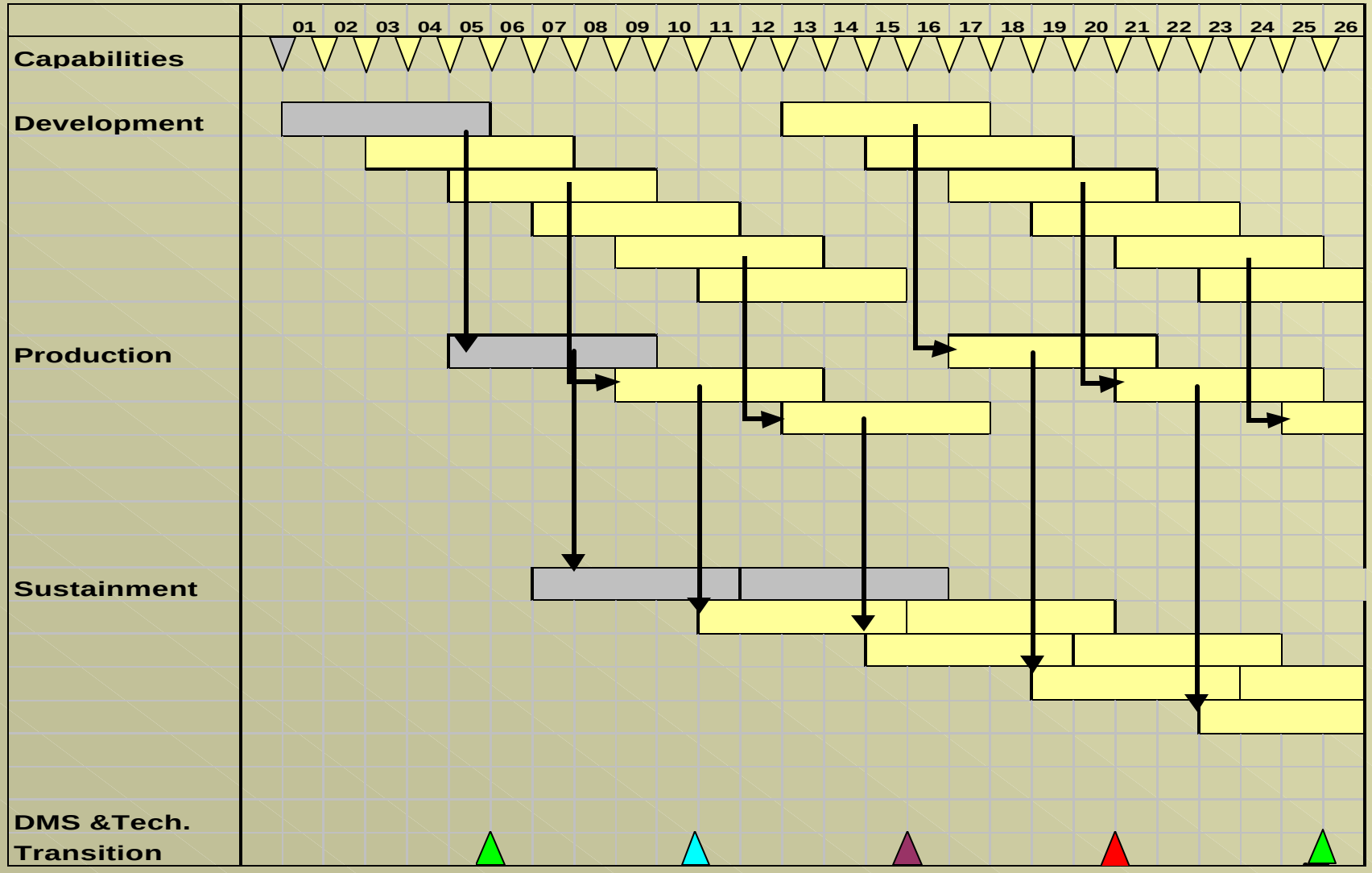
Operational Capability Updates Production Configurations



Operational Capability Updates Sustainment Configurations



DMS / Technology Impacts



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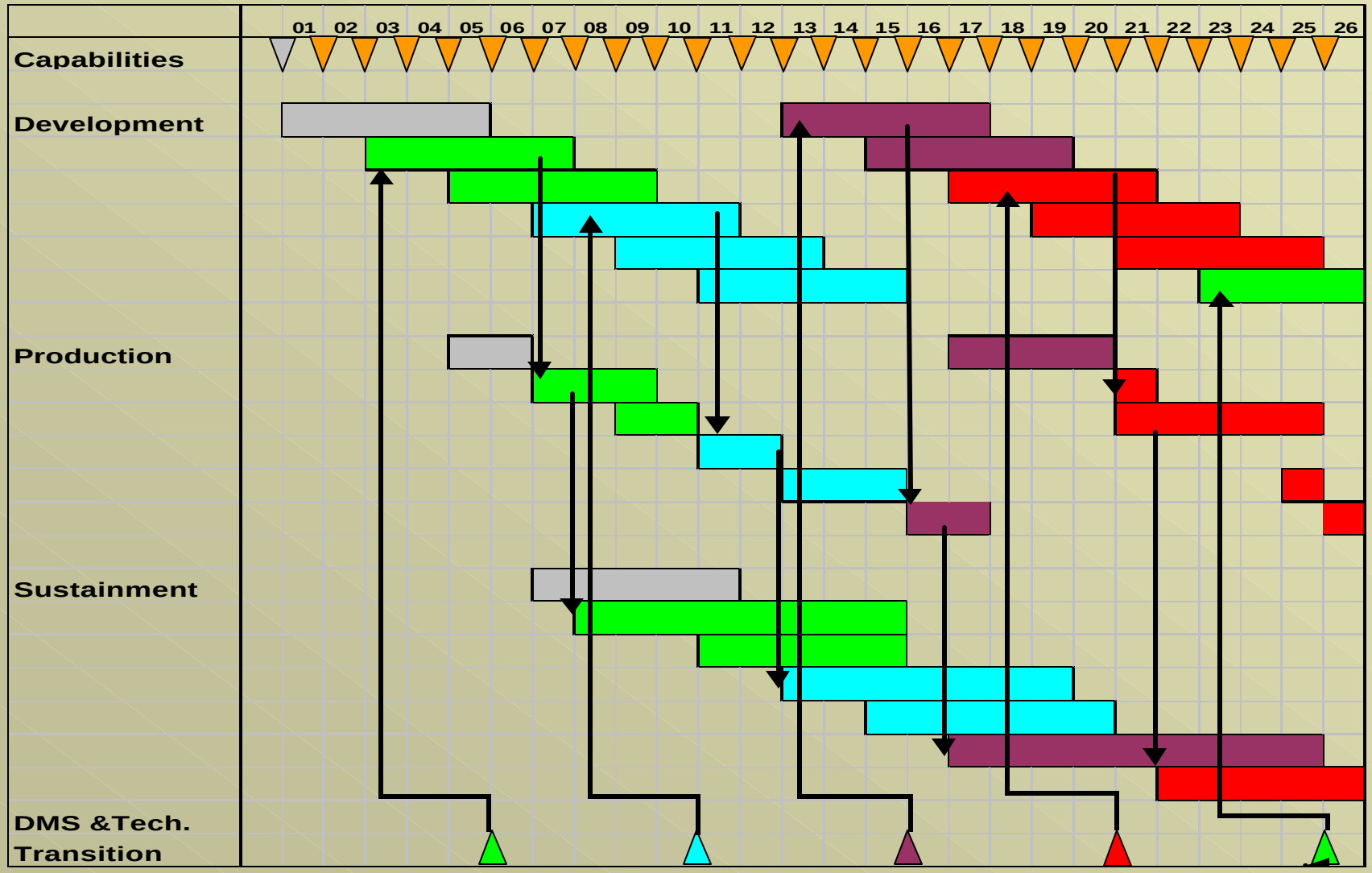

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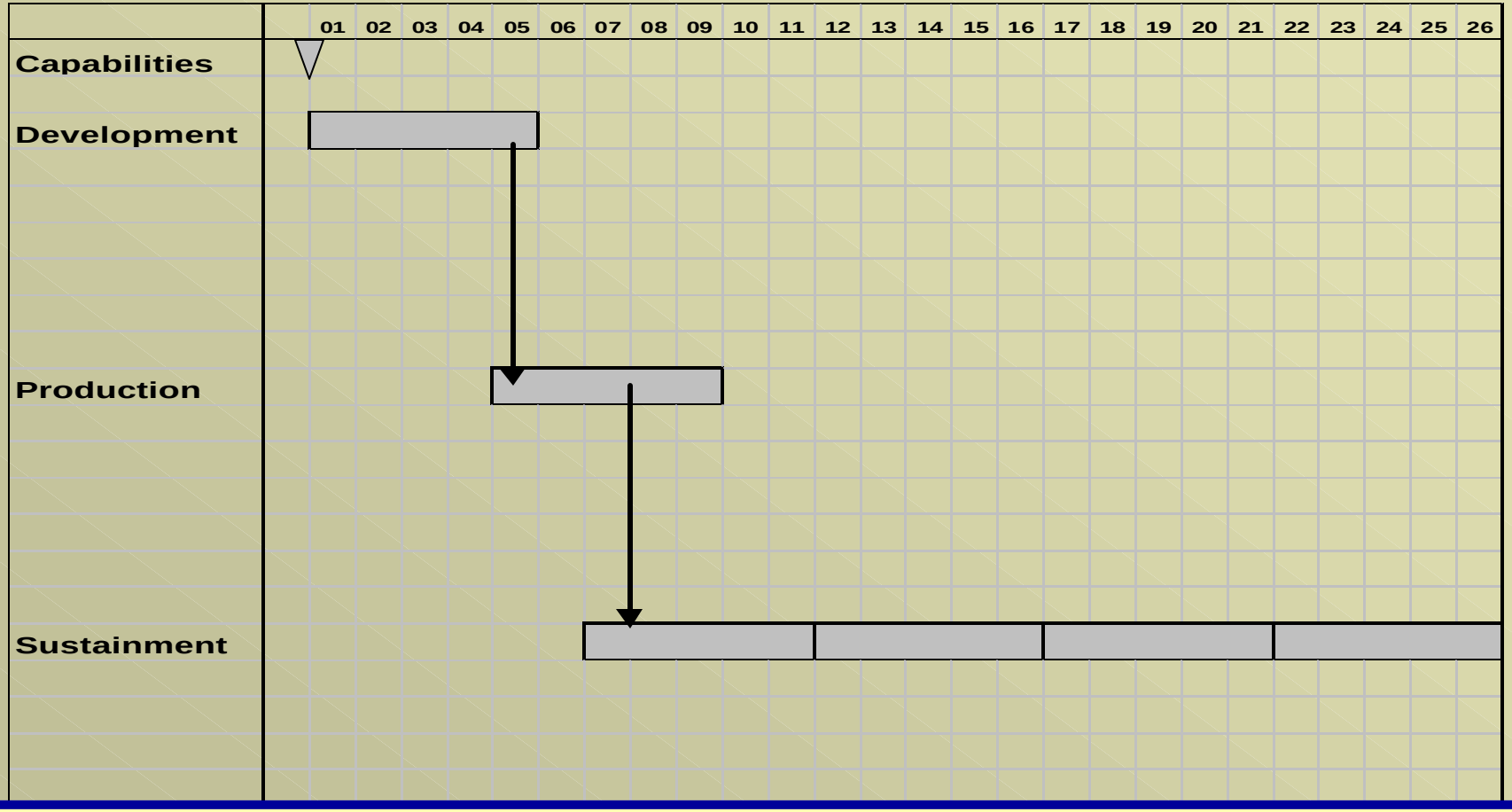
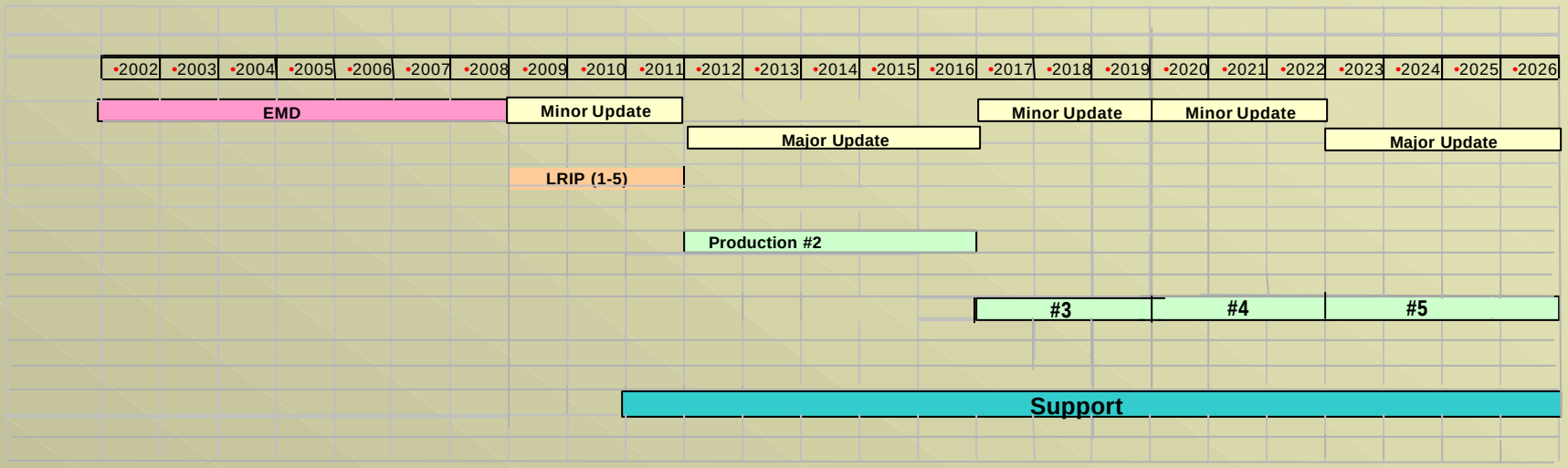
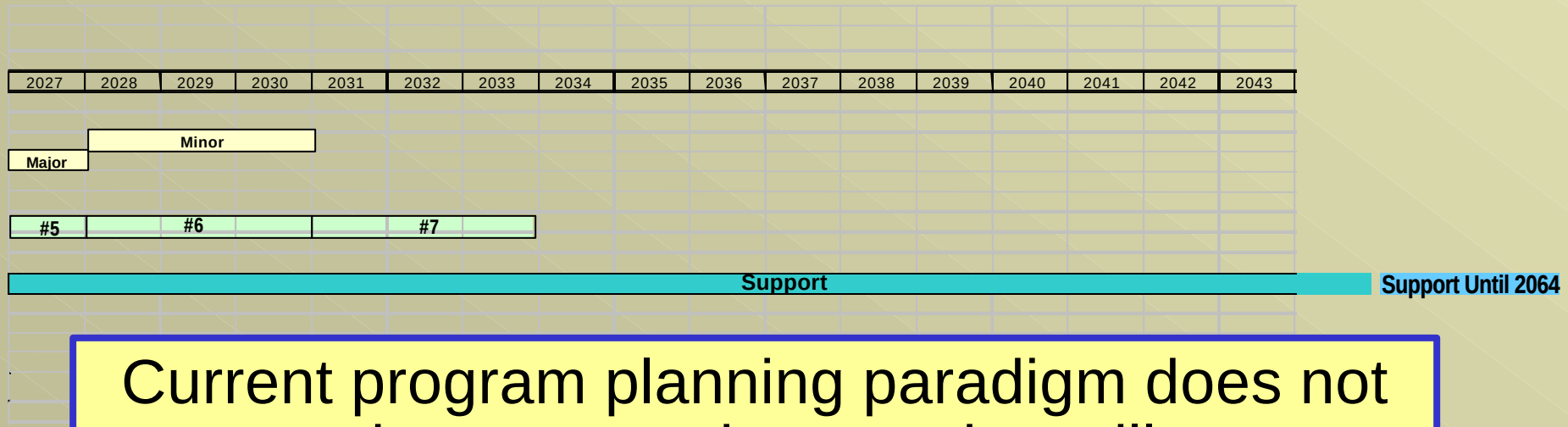


Note: Planned JSF EMD is ~ 10 years, production is 20+ years with 30 years of support after that

Hardware Producibility Example





Current program planning paradigm does not recognize system changes that will occur

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- Brief Introduction
- Paradigm Issue
- **Past Year's Activities**
  - **"Reorganization"**
  - **Proposal Evaluations**
  - **Program Manager's Handbook**
  - **Augmented Best Value Methodology**
- Future

Reorganization

- Stood up Aging Aircraft SPO in Jan 01
  - Continue VCA activities
  - Expand VCA “like” processes to rest of aircraft
- Changed Aging Aircraft SPO to Aging Aircraft Office in Sep 01
  - Continue Aging Aircraft activities
  - Develop long range plans
  - Expanded charter to include being Aeronautical Enterprise manager

Proposal Evaluations

- Incorporated VCA considerations into competitive source selection process
  - C-130 AMP
  - ALR-69 Update (PLAID)
  - Joint Strike Fighter
- Incorporating VCA considerations into sole source processes
- Including VCA attributes in contract execution

Program Manager's Handbook

- Guide for building Integrated Change Roadmaps
- Suggestions with examples for RFP Sections L & M
- Suggestions for Award Fee Criteria
- Suggested Augmented Best Value Methodology

“Augmented” Best Value Methodology

and

Avionics Viability Index

Current Best Value Process

- Considers next production configuration
  - Considers hardware and software development, verification, production, and support
  - Considers producibility environment and processes
  - Considers supportability environment and processes
- Typically, does not consider future change impacts
  - Changes for producibility over “long” production contracts
  - Changes for future operational capability improvement needs
  - Changes for future support needs
  - Changes in technology base

Difficult to evaluate avionics viability in a disciplined manner and difficult to convey to SSA the viability picture

Best Value Methodology Problem Statement

- Today's state:
  - Current Best Value Methodology (BVM) focuses on next contract to be awarded
  - Viable Combat Avionics (VCA) initiative requires consideration of future changes (contracts)
- Desired "to be" state:
  - Contracts that contain VCA considerations evaluate implications of proposed contract on future changes
  - Existing Best Value Methodology is "augmented" to address VCA considerations for the projected life of the weapon system or subsystem

Viability Assessment Areas

For the projected life cycle of the weapon system:

Producibility - **Ability to produce the Sub-System in the future based upon the "current" architecture and design implementation. (Production & Initial Spares, not replenishment Spares)**

Supportability - **Ability to sustain the sub-system in the future and meet the required *Mission Capable* rates. This includes repair and resupply as well as non-recurring redesign for supportability of the "as is" design implementation and performance.**

Future Requirements Growth - **Ability of the subsystem to support projected Combat Capability Requirements with the "current" design and avionics architecture. This includes capability implemented by software updates.**

Avionics Viability Assessment

- Assessing avionics for viability requires evaluating
  - ***Technical Architecture*** viability strengths and weaknesses
  - Contractor ***processes*** (prime and key suppliers) for development, verification, production, and sustainment
  - ***Business strategy*** of government, contractor, and sub-contractors
- Methodology encompasses **development, production, upgrades, and sustainment phases** of the program
  - **Not just EMD plan and initial contract provisions**
- Methodology for offeror to provide viability insight still evolving - some combination of proposal description, questionnaire responses, and case studies

Viability Index

$VI_{life} = a \times Vi_{gro} + b \times Vi_{prod} + c \times Vi_{sus}$

$a + b + c = 1$, permits relative weighting

Vi_{gro} , Vi_{prod} , Vi_{sus} scales = 0 to 3,

- ➪ non-integer values permitted

VI_{life} Scale = 0 to 3, 3 being the best

Criteria

1. Business Strategy

Growth (G)
1.G.1 Redesign and/or procurement of changes.
What are the offeror's strategies for maintaining proactive VCA intiatives for combating obsolescence and minimizing resources for changes? Response should include but not be limited to:
identifying & managing the impact of high rate of turnover components/technologies
ensuring lower tier suppliers proactively identify and manage the impact of high rate of turnover componetns/technologies
leveraging commercial technology investment to support changes vs a reliance on investment from the government
integrating supplier product upgrade plans with regards to component modification and/or replacement
1.G.2 Verification/certification of changes
What is the offeror's strategy for minimizing verification and certification resource requirements? Response should include but not be limited to an explanation of how responsibilities are allocated between prime and vendors and between the government an
1.G.3 Weapon system interface compatibility
What is the offeror's strategy for managing the impact of changes to and from interfacing parts of the weapon system; e.g., training systems, weapons, mission planning systems, and so on?
Producibility (P)
Sustainment (S)

2. Processes

3. Technical Architecture

Scoring Criteria

Assessment criteria	
Responses to the Business Strategy, Processes and System Design & Development questions are to be assessed and assigned a FIGURE OF MERIT (i.e. 0 to 3) as described below:	
3	**HIGHEST SCORE** - Response provides comprehensive understanding of challenges in all disciplines and program phases - Superior strategy for integrating program's roadmap & plans - Significant experience in integrating VCA requirements into design, development, production & support - All projected required resources relating to VCA are available, planned and integrated - Contractually binding.
2	**MEDIUM SCORE** - Response provides reasonable understanding of challenges in all disciplines and program phases - Feasible and executable strategy for integrating program's roadmap & plans - Some experience in integrating VCA requirements into design, development, production & support - Adequate required resources relating to VCA are available & planned - Partial contractual coverage
1	**LOW SCORE** - Response provides minimal understanding of challenges in all disciplines and program phases - Weak strategy for integrating program's roadmap & plans - Minimal experience in integrating VCA requirements into design, development, production & support - Insufficient resources relating to VCA available - No proposed contractual coverage
0	**NO SCORE** - Response provides no understanding of challenges in all disciplines and program phases - No strategy for integrating program's roadmap & plans - No experience in integrating VCA requirements into design, development, production & support - No resources relating to VCA available - No proposed contractual coverage

Viability Index

$$VI_{Life} = a \times Vi_{Growth} + b \times Vi_{Producibility} + c \times Vi_{Sustainment}$$

Weighting determination (a, b, & c)

Tailoring of the VI_{Life} equation to program needs is possible by weighting the relative level of importance for Growth, Producibility, and Sustainment. Note: **a + b + c = 1**

- **a = Growth weighting**
- **b = Producibility weighting**
- **c = Sustainment weighting**

Vi_{Growth}

Growth viability is the ability of the proposed system to easily and affordably incorporate the projected capability changes (Operational Capability Requirements) over the remaining life of the platform. This includes operational capability growth during the development, production, and sustainment phases.

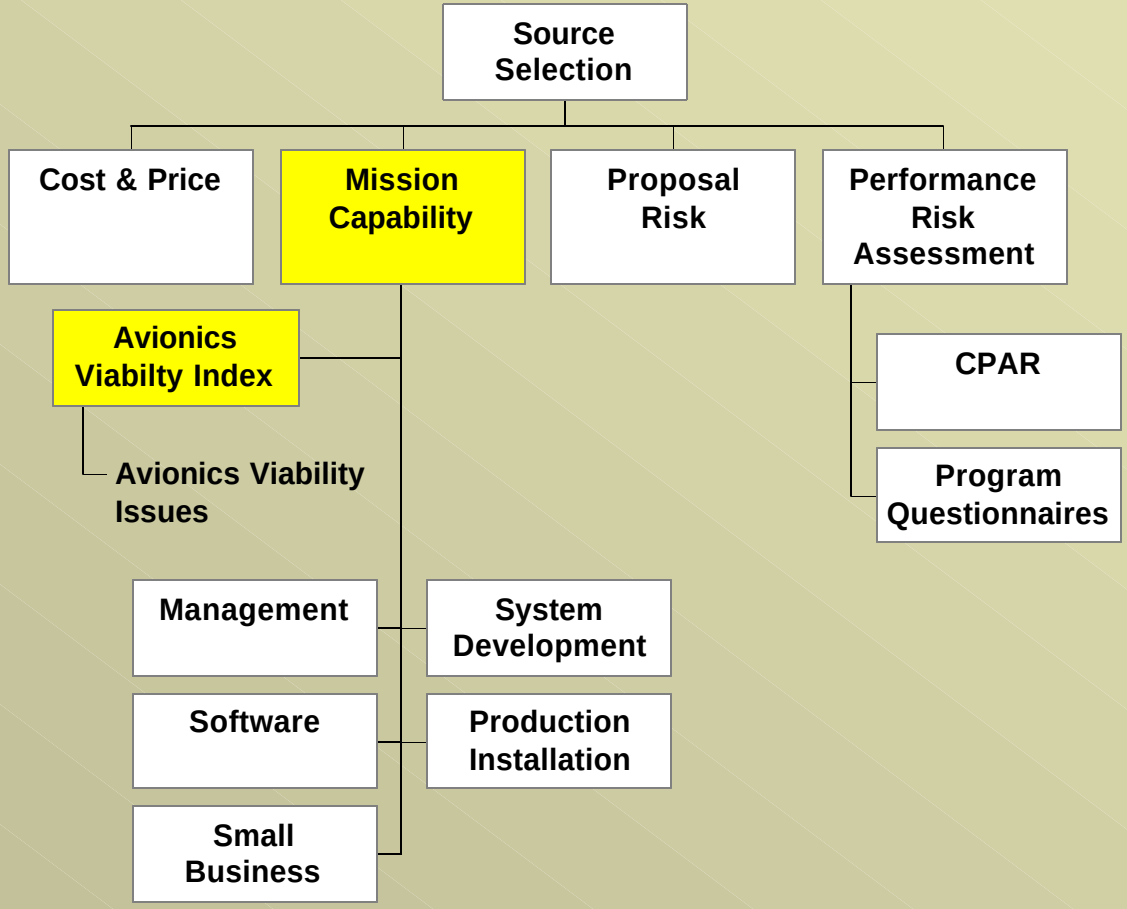
$Vi_{Producibility}$

Producibility viability is the ease and affordability of achieving & maintaining a producible & qualified configuration over the projected production life.

$Vi_{Sustainment}$

Sustainment viability is the ability to affordably keep the system sustainable with the required system performance (i.e., availability, mission capable rate, etc.) over the life of the system. This includes repair, resupply, and redesign.

VCA BVM Implementation



Where Are We

- Developed draft of processes to be used to evaluate viability goodness in a proposal
  - Questions we would ask ourselves as we assess proposals
  - Defining information needed for assessments
- Developed suggested viability metric for decision maker use
- Started coordination process to integrate approach into standard proposal evaluation procedures (competitive and sole source)

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Future

- Mature program manager’s handbook
- Institutionalize “augmented” best value methodology
- Refine program roadmaps and execution plans
- Incentivize solutions that leverage investments across program lines